

REMARKS

The foregoing Amendment and remarks which follow are responsive to the final Office Action mailed December 14, 2001 in relation to Serial No. 09/436,158, and the follow-up telephone interview conducted between Applicant's representative and Examiner Ha on March 25, 2002. Applicant appreciates the time taken by the Examiner to consider and discuss the claim modifications presented in this Amendment, which were previously forwarded to the Examiner in the form of a Claim Memorandum prepared by the Applicant as a precursor to the telephone interview.

By this Amendment, Applicant has amended each of independent Claims 13, 21, 23, 28 and 37 to characterize the leads of the semiconductor package lead frame as each having a middle portion which extends between inner and outer end portions and has a width which is less than that of a spatulate pad (e.g., a wire bonding pad and/or a locking pad) formed in one or both of the inner and outer end portions. Claims 15, 22, 25, 30, 31, 38 and 40 have each been amended only to make the language thereof consistent with that of the amended version of the corresponding independent claim. As discussed between Applicant's representative and the Examiner, the claim modifications presented via this Amendment are for purposes of clarifying what Applicant believes is implicit from the use of the word "spatulate" in the claims in conjunction with the various pads recited therein, i.e., the use of the word "spatulate" in conjunction with each pad implies that such pad has a width exceeding that of the portion of the lead extending to it. The modified language

the middle portion of the corresponding lead

As further discussed during the telephone interview, it is Applicant's view that the Okumura et al. reference cited in the December 14, 2001 Office Action does not teach, suggest or show leads of a lead frame for a semiconductor package having one or more spatulate pads of a width exceeding that of a middle portion of the corresponding lead. In the December 14, 2001 Office Action, Claims 13, 14, 17, 18, 20-33 and 34-45 were rejected under 35 U.S.C. §102(a) as being anticipated by the Okumura et al. reference, with Claims 15, 16 and 19 (which are each dependent upon Claim 13) being rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of the Okumura et al. and Yagi et al. references. Thus, independent Claims 13, 21, 23, 28, and 37 amended via this Amendment currently stand rejected only under Section 102(a) as purportedly being anticipated by the Okumura et al. reference.

The Okumura et al. reference discloses various embodiments of a semiconductor device. In the first embodiment shown in Figures 1(a) and 1(b), the semiconductor device includes a die pad 11 having a plurality of leads 13 arranged about the periphery thereof in spaced relation thereto. Die pad support pins 10 extending from respective ones of the four corner regions defined by the die pad 11 are each provided with a stepped portion 17 such that the die pad 11 is positioned higher in level than the leads 13. There is no teaching or suggestion regarding any lead 13 in the first embodiment including a spatulate pad formed in an inner end portion and/or an outer end portion thereof. In the second embodiment shown in Figures 2(a) and 2(b), the leads 13 arranged about the periphery of the die pad 18 do not include any spatulate pad formed in an

FIG. 1(a) is a perspective view of a semiconductor device in accordance with the first embodiment of the invention. FIG. 1(b) is a cross-sectional view of the semiconductor device of FIG. 1(a) taken along line 1-1. FIG. 2(a) is a perspective view of a semiconductor device in accordance with the second embodiment of the invention. FIG. 2(b) is a cross-sectional view of the semiconductor device of FIG. 2(a) taken along line 2-2. pad 18 is of a reduced size as compared to the die pad 11.

pad 18 is of a reduced size as compared to the die pad 11.

The third embodiment of the semiconductor device shown in Figures 3(a) and 3(b) of the Okumura et al. reference is identical to that shown in the second embodiment, with the exception that the die pad 20 of the third embodiment is provided with an opening 21 therein. Thus, no lead 13 of the third embodiment is shown or described as having a spatulate pad formed in an inner end portion and/or an outer end portion thereof. The same holds true for each lead 13 of the semiconductor device of the fourth embodiment shown in Figures 4(a) and 4(b) of the Okumura et al. reference. In such fourth embodiment, the die pad 20 is formed to include an opening 21 and square corner portions which are described as providing the advantage of smooth application of an adhesive over the semiconductor device. In the semiconductor device of the fourth embodiment, each of the leads 13 is described as including a stepped portion 22 which is formed by removing an inner bottom portion thereof. However, as indicated above, no lead 13 of the fourth embodiment is shown or described as including a spatulate pad having the width characteristics recited in the pending claims in an inner end portion and/or an outer end portion thereof. The same also holds true for the semiconductor device of the fifth embodiment shown in Figures 5(a) and 5(b) of the Okumura reference. The semiconductor device of the fifth embodiment is similar to that of the fourth embodiment, with the distinctions being that the die pad 20 in the fifth embodiment is formed to have circular corner portions which are also described as providing the advantage of smooth application of an adhesive over the semiconductor device, and

fourth embodiment, none of the leads 13 of the semiconductor device of the fifth embodiment is

shown or described as including a spatulate pad formed within an inner end portion and/or an outer end portion thereof.

The sixth embodiment of the semiconductor device shown in Figures 6(a) and 6(b) of the Okumura et al. reference does not include any die pad, though the leads 23 of the sixth embodiment are identically configured to those of the fifth embodiment. In this regard, though each of the leads 23 of the sixth embodiment includes a stepped portion 22, none of the leads 23 is shown or described as including a spatulate pad formed within an inner end portion and/or an outer end portion thereof. The semiconductor device of the seventh embodiment shown in Figures 7(a), 7(b), 7(c) and 8 of the Okumura et al. reference is similar to the second embodiment, except that each of the leads 13 in the seventh embodiment is subjected to a half etching process to remove inner and outer bottom portions thereof for purposes of defining a resultant terminal portion 16 which, as shown in Figure 8, is exposed within the sealing resin 15 of the semiconductor device. As such, the Okumura et al. reference also fails to teach or suggest any of the leads 13 of the seventh embodiment including a spatulate pad formed within an inner end portion and/or an outer end portion thereof. Finally, the eighth embodiment of the semiconductor device shown in Figures 9(a), 9(b), 9(c) and 10 of the Okumura et al. reference is similar to the seventh embodiment, with the distinction being that ball electrodes 26 composed of solder balls are provided on respective ones of the terminals 16 defined by the leads 13. Thus, none of the leads 13 of the eighth embodiment are shown or described in the Okumura reference as including

advanced in the final Office Action mailed December 14, 2001 have been overcome, and that the

present application is now in condition for allowance. An early Notice of Allowance is therefore respectfully requested. Resubmitted herewith for the Examiner's consideration are the Power of Attorney documents previously faxed to the Examiner on March 25, 2002.

Attached hereto is a marked-up version of the changes made to the claims by the current Amendment. The attached page is captioned "Version with markings to show changes made".

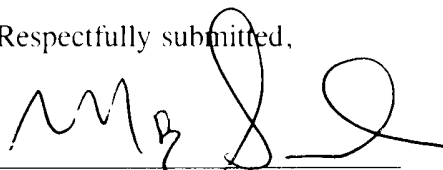
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Date:

4/5/02

By:

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Please amend the following claims:

13. (Twice Amended) A semiconductor package, comprising:

a metal lead frame, including a plurality of elongate leads arrayed around a central region thereof, each lead having an outer end portion extending away from the central region ~~and~~ an inner end portion extending toward the central region, and a middle portion extending between the outer and inner end portions, the middle portion being of a lead width and having a lower surface which defines a land;

a spatulate locking pad in ~~an~~ the outer end portion of each lead ~~adjacent to its outer end~~ and having a locking pad width which exceeds the lead width;

a spatulate wire bonding pad in ~~an~~ the inner end portion of each lead ~~adjacent to its inner end~~ and having a bonding pad width which exceeds the lead width;

~~a land defined on a lower surface of each lead between the locking pad and the bonding pad; and,~~

a die pad attached to the lead frame in the central region thereof and adjacent to the inner ~~ends~~ end portions of the leads, the die pad having an upper surface and a lower surface.

15. (Amended) The semiconductor package of claim 13, wherein the middle portion of

each of the leads is about 0.18 mm wide, and wherein the leads have a pitch of about 0.5 mm.

21. (Amended) A lead frame for a semiconductor package, comprising:

a plurality of elongate metal leads arrayed around a central region, each lead having an outer end portion extending away from the central region ~~and~~ an inner end portion extending toward the central region, and a middle portion extending between the outer and inner end portions, the middle portion being of a lead width and having a lower surface which defines a land;

a spatulate pad formed into each of the inner and outer ends end portions of each lead, each of the spatulate pads of each lead having a pad width which exceeds the lead width;
~~— a land defined on a lower surface of each lead by and between the spatulate pads formed into the inner and outer ends thereof; and,~~

a disposable frame connected to the leads.

22. (Amended) The lead frame of claim 21, further comprising a die pad disposed in the central region and adjacent the inner ~~ends~~ end portions of the leads, the die pad having a recessed shoulder extending around a periphery of a lower surface thereof.

23. (Amended) A semiconductor package of a type that includes a ductile metal lead frame having a plurality of elongate leads radiating out from a central die pad, a semiconductor die mounted on the pad, a plurality of wire bonds connecting the die to the leads, and a protective plastic body molded over the leads, the pad, the die, and the wire bonds, the improvement in combination

~~a spatulate wire bonding pad formed into the inner end portion of each lead and~~

adjacent to the die pad, the wire bonding pad having a bonding pad width; and,

a spatulate locking pad formed into an outer end portion of each lead and intersecting with a sidewall of the plastic body having a locking pad width;

the bonding pad width and the locking pad width each exceeding a lead width of a middle portion of each lead extending between the inner and outer end portions thereof.

25. (Amended) The semiconductor package of claim 23, ~~further comprising wherein the middle portion of each lead has a lower surface defining a land defined on a lower surface of each lead by and which extends between the spatulate wire bonding and locking pads thereof.~~ each land having a lower surface exposed through a lower surface of the plastic body.

28. (Twice Amended) A semiconductor package of a type that includes a ductile metal lead frame having a plurality of elongate leads radiating out from a central die pad, a semiconductor die mounted on the pad, a plurality of wire bonds connecting the die to the leads, and a protective plastic body molded over the leads, the pad, the die, and the wire bonds, the improvement in combination therewith comprising:

a spatulate locking pad formed into an outer end portion of each lead and intersecting with a sidewall of the plastic body having a locking pad width which exceeds a lead width of a middle portion of each lead.

30. (Amended) The semiconductor package of Claim 28, further comprising:

means formed into an inner end portion of each lead and adjacent to the die pad for

31. (Amended) The semiconductor package of claim 28, further comprising:

the wire bonding area comprises a spatulate wire bonding pad formed into the inner end portion of the lead and having a bonding pad width exceeding the lead width.

37. (Amended) A semiconductor package of a type that includes a metal lead frame having a plurality of elongate leads radiating out from a central region thereof, the lead having inner end portions adjacent to the central region ~~and~~ outer end portions distal therefrom, middle portions extending between the inner and outer end portions, a semiconductor die mounted in the central region, and a protective plastic body molded over the leads and the die, the improvement in combination therewith comprising at least one spatulate ~~locking~~ pad formed in at least one of the leads and having a pad width which exceeds a lead width of each of the middle portions of the leads, the at least one spatulate ~~locking~~ pad being underfilled by the plastic body.

38. (Amended) The semiconductor package of Claim 37, wherein the at least one spatulate pad is formed in the outer end portion of the at least one lead.

40. (Amended) The semiconductor package of Claim 37, wherein the at least one spatulate pad is formed in the inner end portion of the at least one lead.